The Impact of the Increasing Number of Multiple Births on the Rates of Preterm Birth and Low Birthweight: An International Study

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Objectives. We studied the effects of twins and triplets on perinatal health indicators in the overall population in the 1980s and 1990s in Canada, England and Wales, France, and the United States.

Methods. Data were derived mostly from live birth registration. We used rates, relative risks, and population attributable risks for twins and triplets separately.

Results. In each country, the increase in multiple births, and the increase in preterm delivery among multiple births, contributed almost equally to the rise in or stabilization of the overall rates of preterm delivery. Twins contributed a much larger proportion of the preterm deliveries and low-birthweight newborns than did triplets.

Conclusions. Twins have a major population-based impact on the trends of perinatal health indicators. (*Am J Public Health.* 2002;92:1323–1330)

Despite programs and policies in a number of countries designed to lower the incidence of preterm birth (<37 weeks of gestation) and low birthweight (<2500 g), these adverse birth outcomes have not decreased in the past 10 to 15 years. In some countries, they have actually increased substantially. For example, in the United States between 1981 and 1997, the preterm birth rate increased by approximately 21%.[1] An increase has also been noted in Canada for preterm delivery[2] and in England and Wales for low birthweight.[3]

This rise in the proportion of babies born too early or too small represents an important public health concern for a number of reasons. Preterm newborns account for about 70% of perinatal mortality,[4] and preterm survivors are still at increased risk for health and developmental problems.[5–7] Furthermore, preterm and low-birthweight newborns are more likely to need intensive care, with the attendant emotional and financial costs.[8,9]

Over the past 10 to 15 years, the rates of multiple births have risen in many countries.[10,11] Because multiple births are at high risk of resulting in preterm birth and low birthweight,[12,13] their increasing incidence affects the overall rates of both conditions. Previous studies on the effects of multiple births have shown their important influence on pregnancy outcomes in some countries.[2,14,15] However, no study has explored the independent effect of twin and triplet deliveries on trends in preterm births and low birthweight from an international perspective; that is, in countries with different health indicators and health care systems. Furthermore, it is unclear how much of the overall impact is due to (1) the increase in the occurrence of multiple births and how much is due to (2) preterm delivery and low birthweight among multiple births.

In this report, we examine trends in multiple live births and their impact on the rates of preterm delivery and low birthweight in the early 1980s and the late 1990s. This analysis was carried out in Canada, England and Wales, France, and the United States. Data were drawn from vital statistics or nationally representative surveys of births.

METHODS

Population and Sources of Data

Data were obtained through special analyses of birth certificate data from Canada, England and Wales, and the United States from 1981 to 1997.[16–18] In Canada, we excluded Newfoundland and Ontario because of problems in the availability or quality of the data.[19] England and Wales have a common registration system and were considered a single data source for the purposes of this study. Birthweights are included in birth notifications by midwives and are subsequently linked to the data from birth registration; gestational age is not included in this process. In France, the numbers of singletons, twins, and triplets or higher-order multiple births were derived from birth registration.[20] Data on gestational age and birthweight were obtained from national representative samples of births in 1981, 1995, and 1998, as these data are not collected routinely at birth registration.[21,22]

The analysis was restricted to live births. No lower-gestational-age or birthweight criterion was applied to exclude extremely preterm or small newborns, apart from the very low limit of 20 weeks in the United States.

In Canada, gestational age in completed weeks is obtained from doctors; it is increasingly based on ultrasound examination. In the United States, gestational age is computed from the last menstrual period. Since 1989, clinical estimates of gestation have been used in the approximately 5% of births in which the last menstrual period is unknown or inconsistent with birthweight.[1] In the 1981 French survey, gestational age was computed from the last menstrual period, whereas in the 2 subsequent surveys, the best estimate was made on the basis of the date of the last menstrual period and the ultrasound data as noted in the medical records. Information on gestational age or birthweight was missing for 1% or fewer live births in each data set, except for in France in 1981 (7.2%) and in the United States from 1981 to 1997 (about 5%).

Analysis

We used the usual definition of preterm birth (<37 completed weeks of gestation) and

low birthweight (<2500 g). We also studied other limits (<33 weeks and <1500 g, respectively), because most babies under those limits require intensive care as newborns and have high risks of mortality and impairments as infants.

The analysis was conducted separately for (1) twins and (2) triplets and higher-order multiple newborns. For convenience, we refer to this latter group as triplets.

We first analyzed the temporal trends in the rates of twins and triplets in each country. Rates were computed for each calendar year from 1981 to 1997. The rates of twins and triplets were defined per 1000 live births. We then compared the distribution of preterm gestational ages and low birthweight for singletons, twins, triplets, and the overall population of newborns in the early 1980s and the late 1990s. Because the number of triplets was relatively small, we combined data for the years 1981 to 1983 and 1995 to 1997. In England and Wales, data on birthweight were incomplete before 1983, so we used only 1983 for the first period. For France, we used the data from the 1981 national survey on the one hand, and the combined data from the 1995 and 1998 surveys on the other. Differences of 1 or 2 years among study countries probably had only a minor effect on the results, given the length of the overall study period. Because of the small number of multiple births in the French samples, we tested the observed differences for statistical significance with Pearson χ^2 tests.

Relative risks and population attributable risks for preterm and very preterm births and for low and very low birthweight, together with their confidence intervals,[23] were calculated for twins and triplets, with singletons as the reference group, using the relative risks and the proportions of twins and triplets in the relevant country.

Finally, we assessed the respective roles of trends in the number of multiple births and trends in pregnancy outcomes among these births on the overall preterm and low-birthweight rates. First, we compared present rates of preterm delivery and low birthweight with the rates that would have been expected if multiple-birth rates had remained at their 1982 level. Second, we compared the present rates with the rates that would have been expected if the rates of preterm delivery and low birthweight among twins and triplets had remained at their 1981–1983 level.

TABLE 1—Multiple Births: Rate and Time Trends Between 1981 and 1997

		Twins			Triplets or More		
	Total No. Live Births	No.	Rate per 1000	Increase per 100, 1981–1997	No.	Rate per 1000	Increase per 100, 1981–1997
Canada							
1981	238 937	4304	18.0		84	0.3	
				+28			+197
1997	210 174	4849	23.1		218	1.0	
England–Wales							
1982[a]	625 931	12 154	19.4		230	0.4	
				+41			+273
1997	643 095	17 551	27.3		890	1.4	
France							
1982[a]	797 223	15 550	19.5		423	0.5	
				+45			+111
1997	726 768	20 585	28.3		814	1.1	
USA							
1981	3 629 238	70 049	19.3		1385	0.4	
				+39			+358
1997	3 884 329	104 208	26.8		6752	1.7	

[a]Data from 1981 unavailable.

RESULTS

In 1981 to 1997, the rate of twins increased by 28% to 45% in each country (Table 1 and Figure 1). The increases in triplet rates were even more dramatic: 358% in the United States, 273% in England and Wales, 197% in Canada, and 111% in France. In Canada, there were annual fluctuations in triplet rates in the 1990s; the rate for 1995 to 1997 combined was 106% greater than that for 1981.

In 1995 to 1997, overall preterm delivery rates ranged from 5.8% in France to 11.1% in the United States (Table 2). In 1995 to 1997, the preterm birth rate in Canada was 11% higher than that for 1981 to 1983, and the US rate was 15% higher. Singleton preterm delivery rates were under 10% in 1995 to 1997; however, the rates for twins were nearly 50%, and those for triplets were over 90%. Whereas the preterm rates for singletons followed different patterns among the countries over the study period, the rates for twins and triplets increased in Canada and the United States, with the most marked increases being from 33 to 36 weeks. There was a similar trend in France for twins, but the difference was not significant.

In 1995 to 1997, the percentage of low-weight births ranged from 5.7% in Canada to 7.5% in the United States. The increases in low birthweight were 9% in England and Wales and the United States and 26% in France. Among singletons, the variations in the percentage of low birthweight over the study period were not large, except in France. A slight increase in the proportion of newborns under 2500 g was observed in each country among twins and triplets, but it was not significant for twins in France.

The relative risks for preterm delivery in twins compared with singletons in 1995 to 1997 ranged from 5.4 to 9.5 for deliveries before 37 weeks and from 7.1 to 12.1 for deliveries before 33 weeks (Table 3). The corresponding population attributable risks ranged from 10.3% to 18.7% for deliveries before 37 weeks and from 13.7% to 21.3% for de-

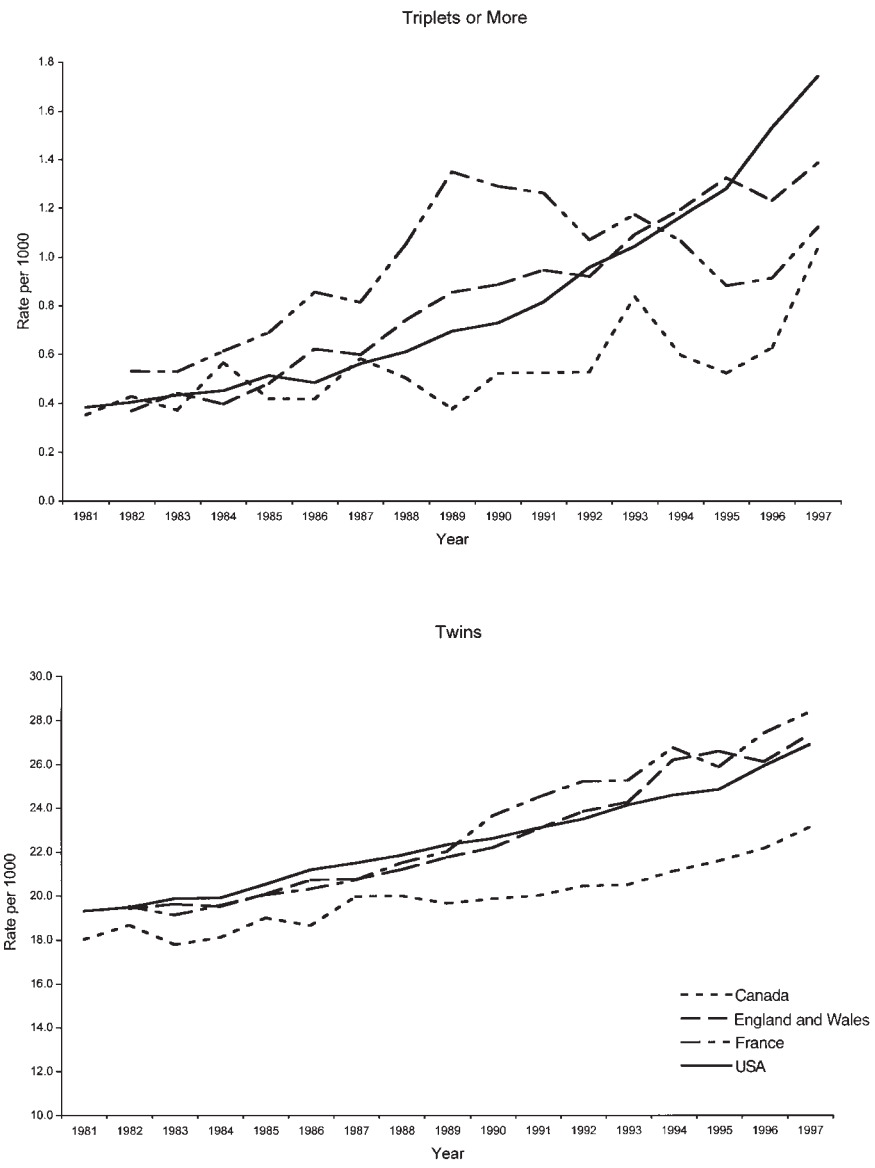

FIGURE 1—Trends in twin and triplet or higher-order births (rates per 1000 live births).

liveries before 33 weeks. Whereas the relative risks were much higher for triplets than for twins, triplets' population attributable risks were much lower: about 1% for deliveries before 37 weeks and just under 4% for deliveries before 33 weeks. An increase in relative risks for preterm birth was observed in each country between the periods 1981–1983 and 1995–1997 for twins and triplets compared with singletons, except for triplets born before 33 weeks in Canada. Population attributable risks for preterm and very preterm birth also increased for both twins and triplets; among twins, the increases in population attributable risk for deliveries before 33 weeks were 41% in the United States and 45% in Canada.

Changes in the relative risks for birthweights under 2500 g were small and inconsistent among the study countries (Table 4). However, an increase in population attributable risks for both twins and triplets was observed in each country, except for twins in France.

Table 5 shows that if the rates of twins and triplets in 1995 to 1997 had been similar to those observed in 1982, the overall rates of preterm delivery would have been lower in all countries. If the rates of preterm delivery of twins and triplets in 1995 to 1997 had been the same as those in 1981 to 1983, the overall rates would also have been lower. The differences between the actual and the expected rates show that in each country, the effect of the increase in twins and triplets was similar to the effect of the increase in the preterm delivery rates in multiple births. Table 5 indicates that, unlike the results for preterm delivery, for low birthweight only the increase in rates of multiple births—and not changes in the low birthweight rate among multiple births—contributed to an increase in the overall low birthweight rate.

DISCUSSION

In both North America and Europe, the occurrence of multiple births has increased substantially. Furthermore, among multiple births, the risk of preterm births has also increased. These 2 trends contributed almost equally to the rise in or the stabilization of the overall preterm delivery rates. Multiple births also had an impact on the trends in low birthweight, mainly because of increasing numbers. In 1995 to 1997, twins accounted for an appreciable proportion of preterm and low-birthweight newborns, whereas triplets accounted for only a very small proportion of such newborns.

The trends in perinatal health indicators were studied from 1981 onward, because that was the year that data on these indicators became available in each country. The selection of this period has the effect of underestimating the overall impact of multiple births, given that the rates of multiple births began to increase from the mid-1970s onward in most countries.[3,24–26] However, because the increase in multiple births was initially slow, this underestimation should not greatly affect our results.

The rates of multiple births in the study countries were not exceptionally high compared with rates in some other countries.[10] For example, there were 18 sets of twins per 1000 maternities (pregnancies leading to a

TABLE 2—Live Births by Multiplicity, Gestational Age, and Birthweight

			Gestational Age (wk), %				Birthweight (g), %			
	Years	No.	<28	28–32	33–36	<37	<1000	1000–1499	1500–2499	<2500
Canada										
Singletons	1981–1983	700 744	0.3	0.8	4.6	5.7	0.3	0.4	4.3	5.0
	1995–1997	638 351	0.3	0.8	4.8	5.9	0.3	0.4	3.9	4.6
Twins	1981–1983	12 959	3.4	7.4	27.7	38.5	3.6	4.6	40.3	48.5
	1995–1997	14 527	3.7	9.4	37.1	50.2	3.8	5.4	40.7	49.9
Triplets or more	1981–1983	273	10.3	31.8	40.0	82.1	14.2	25.9	49.7	89.8
	1995–1997	474	9.7	28.9	58.2	96.8	11.2	23.2	59.2	93.6
All	1981–1983	713 976	0.3	1.0	5.0	6.3	0.4	0.4	5.0	5.8
	1995–1997	653 352	0.4	1.0	5.6	7.0	0.4	0.5	4.8	5.7
England–Wales[a]										
Singletons	1983	615 710	…	…	…	…	0.2	0.5	5.1	5.8
	1995–1997	1 881 643	…	…	…	…	0.4	0.5	5.1	6.0
Twins	1983	12 282	…	…	…	…	2.4	5.3	42.7	50.4
	1995–1997	51 519	…	…	…	…	3.2	5.9	43.8	52.9
Triplets or more	1983	277	…	…	…	…	6.9	20.9	66.4	94.2
	1995–1997	2539	…	…	…	…	11.9	23.2	60.8	95.9
All	1983	628 269	…	…	…	…	0.3	0.5	5.9	6.7
	1995–1997	1 935 701	…	…	…	…	0.5	0.7	6.1	7.3
France[b]										
Singletons	1981	5025	…[c]	0.6	4.5	5.1*	…[c]	0.2	3.7	3.9***
	1995–1998	25 853	0.1	0.6	3.9	4.6	0.1	0.4	4.3	4.8
Twins	1981	108	…[c]	…[c]	…[c]	34.3*	…[c]	…[c]	…[c]	47.9*
	1995–1998	769	2.6	5.5	35.6	43.7	2.7	4.7	45.3	52.7
Triplets or more[c]	…	…	…	…	…	…	…	…	…	…
All	1981	5134	…[c]	0.7	5.0	5.7*	…[c]	0.3	4.6	4.9**
	1995–1998	26 643	0.2	0.8	4.8	5.8	0.2	0.5	5.5	6.2
USA										
Singletons	1981–1983	10 165 548	0.6	1.5	6.8	8.9	0.6	0.5	4.9	6.0
	1995–1997	11 227 102	0.6	1.5	7.7	9.8	0.7	0.5	5.0	6.2
Twins	1981–1983	202 782	4.5	9.2	27.4	41.1	5.3	5.4	40.2	50.9
	1995–1997	298 094	4.5	10.2	39.0	53.7	5.1	5.4	43.1	53.6
Triplets or more	1981–1983	4088	12.3	27.2	38.7	78.2	18.0	19.0	52.3	89.3
	1995–1997	17 339	12.5	34.9	45.5	92.9	15.7	21.8	55.7	93.2
All	1981–1983	10 372 418	0.7	1.6	7.3	9.6	0.7	0.6	5.6	6.9
	1995–1997	11 542 535	0.7	1.8	8.6	11.1	0.8	0.7	6.0	7.5

[a]No data on gestational age; data for 1983 only.
[b]Data from national representative samples of births: 1 in 1981 and 2 in 1995 and 1998.
[c]Too few cases in the samples.
*$P \leq .05$; **$P < .01$; ***$P < .001$ for comparisons between 1981 and 1995 to 1997 in France.

live or still birth) in the Flemish part of Belgium in 1996[27] and 15.9 sets of twins per 1000 maternities in the Netherlands in 1995,[28] compared with 13.2 per 1000 in France[24] and 13.6 per 1000 in England and Wales in 1995.[3] If rates in the study countries continue to rise to the levels seen in Flanders and the Netherlands, we can expect further increases in the study countries' population attributable risks for twins and triplets in the near future.

We observed fairly similar trends in multiple-birth rates and the impact of those births on preterm delivery and low birthweight in all study countries, despite differences in health care systems and in indicators of pregnancy outcome. This suggests that the countries experienced similar changes in clinical practice and in the social factors contributing to multiple births, and that they share similar public health concerns.

The increases in rates of both twins and triplets in each country reflect, to some extent, the rising maternal age at childbirth ob-

TABLE 3—Relative Risk (RR) and Population Attributable Risk (PAR) for Preterm Delivery of Twins and Triplets Compared With Singletons

	RR (95% CI)		PAR % (95% CI)	
	< 33 wk	< 37 wk	< 33 wk	< 37 wk
	Twins			
Canada				
1981–1983	9.7 (9.1, 10.2)	6.8 (6.6, 7.0)	13.6 (12.8, 14.3)	9.5 (9.2, 9.8)
1995–1997	12.1 (11.5, 12.6)	8.4 (8.2, 8.6)	19.7 (18.9, 20.6)	14.1 (13.8, 14.4)
France[a]				
1981	. . .[b]	6.7 (5.1, 9.0)	. . .[b]	13.5 (9.4, 17.4)
1995–1998	11.0 (8.3, 14.5)	9.5 (8.6, 10.4)	21.3 (15.7, 26.5)	18.7 (16.7, 20.7)
USA				
1981–1983	6.5 (6.4, 6.6)	4.6 (4.6, 4.6)	9.7 (9.6, 9.8)	6.6 (6.6, 6.7)
1995–1997	7.1 (7.1, 7.2)	5.4 (5.4, 5.5)	13.7 (13.5, 13.8)	10.3 (10.2, 10.4)
	Triplets or more			
Canada				
1981–1983	37.7 (32.7, 43.3)	14.5 (13.7, 15.3)	1.4 (1.1, 1.6)	0.5 (0.4, 0.6)
1995–1997	35.6 (31.7, 40.0)	16.2 (15.9, 16.5)	2.5 (2.1, 2.8)	1.1 (1.0, 1.2)
USA				
1981–1983	18.7 (18.0, 19.5)	8.8 (8.6, 8.9)	0.7 (0.7, 0.7)	0.3 (0.3, 0.3)
1995–1997	22.8 (22.5, 23.2)	9.4 (9.5, 9.4)	3.2 (3.1, 3.2)	1.2 (1.2, 1.3)

Note. CI = confidence interval.
[a]Data from national representative samples of births: 1 in 1981 and 1 each in 1995 and 1998.
[b]Too few cases in the sample.

served in most developed countries,[1,29] given that multiple-birth rates are higher for older women.[10] It has been estimated that between a quarter and a third of the increase in twin and triplet deliveries can be attributed to the increase in maternal age, even without the impact of subfertility treatments, which are more frequent among older women.[24,30–32] The effects of ovarian stimulation and assisted reproductive technologies (ART) on rates of multiple births have been even greater than the effect of increased maternal age. Estimates based solely or partly on data from surveys or registers showed that in the late 1980s and in the 1990s, between 20% and 40% of triplet deliveries followed ART, and, in all, that about three quarters of triplet deliveries occurred after procedures for subfertility.[24,30,33,34] The contribution of these procedures to twin deliveries is less well established, but it seems to be much lower. ART accounted for 2% of twin maternities in the United States in 1990 to 1991,[30] about 10% in France in 1993,[24] and 13% in Sweden in 1991 to 1995.[32] In East Flanders, subfertility procedures accounted for more than 30% of twin births in the early 1990s.[10] Statistics from French subfertility clinics[35] suggest that a decrease in triplet rates in the beginning of the 1990s resulted partly from declines in the proportion of transfers involving 3 or more embryos, coinciding with the introduction of selective reduction, at a time when increases in total numbers of women treated were relatively small.

Whereas triplets had very high relative risks of preterm delivery and low birthweight in the study countries, the corresponding population attributable risks were very often below 2%. This reflects the very low numbers of triplet births in each country. In contrast, a relatively higher proportion of preterm and low-weight births were attributable to twins. In 1995 to 1997, the population attributable risks for preterm delivery of twins ranged from 10.3% to 18.7%, and those for low-weight births ranged from 16.6% to 21.4%. Differences between countries were due mainly to varying rates of preterm delivery and low birthweight among singletons.

The risks of very preterm delivery and very low birthweight attributable to twins were higher than the risks of overall preterm delivery or low birthweight. In 1995 to 1997, population attributable risks were about 20% in Canada and in England and Wales. They were even higher in France, but the confidence intervals were wide. Newborns under 33 weeks or 1500 g need intensive care in neonatal units, and they have high risks of neonatal morbidity and developmental problems. Therefore, the rising number of twins will increase the burden on neonatal services and health services in general,[36] as well as resulting in higher numbers of children surviving with impairment higher numbers of children surviving with impairment.[37]

In Canada, France, and the United States, the impact of multiple births on preterm delivery resulted as much from the rise in the occurrence of twins as from the rise in preterm delivery among twins. This trend in preterm delivery among twins was observed mainly between 33 and 36 weeks. It may be explained by a more aggressive management of twin pregnancies; for example, by an increase in inductions of labor and cesarean deliveries before 37 weeks, as has been suggested by previous analyses of American data.[38] The increasing proportion of nonspontaneously conceived twins might also have affected the preterm delivery rates. However, a large population-based study found in 1999 that twins conceived by ART had gestational ages similar to those of spontaneously conceived twins.[39]

Many interventions for reducing the rates of preterm delivery in twin pregnancies have been proposed. The effectiveness of some, such as those attempting to decrease workload and fatigue, implementing intensive surveillance, or stopping threatened preterm labor,[40] has not been clearly established. Others, such as policies of hospitalization for bed rest[41] and home uterine activity monitoring,[42] have been shown to be ineffective. In addition, the high rate of preterm delivery among twins is partially due to medical interventions to end pregnancy, or decisions not to prevent preterm delivery, where this is thought to benefit the newborns. This practice is influenced by the belief that multiple births have advanced maturity compared with single-

TABLE 4—Relative Risk (RR) and Population Attributable Risk (PAR) for Low Birthweight for Twins and Triplets Compared With Singletons

	RR (95% CI)		PAR % (95% CI)	
	<1500 g	<2500 g	<1500 g	<2500 g
	Twins			
Canada				
1981–1983	11.9 (11.1, 12.7)	9.7 (9.5, 9.9)	16.5 (15.5, 17.4)	13.7 (13.3, 14.0)
1995–1997	12.8 (12.1, 13.6)	10.8 (10.6, 11.0)	20.8 (19.7, 21.9)	17.9 (17.5, 18.3)
England–Wales				
1983	11.0 (10.3, 11.8)	8.7 (8.5, 8.9)	16.4 (15.3, 17.4)	13.1 (12.8, 13.4)
1995–1997	9.7 (9.4, 10.0)	8.8 (8.7, 8.9)	18.7 (18.2, 19.3)	17.2 (17.1, 17.5
France[a]				
1981	. . .[b]	12.4 (9.8, 15.6)	. . .[b]	23.6 (18.4, 28.5
1995–1998	13.7 (10.2, 18.5)	11.0 (10.1, 12.0)	25.7 (18.9, 31.9)	21.4 (19.3, 23.4
USA				
1981–1983	9.4 (9.3, 9.6)	8.4 (8.4, 8.5)	14.1 (13.9, 14.3)	12.7 (12.6, 12.7
1995–1997	8.8 (8.7, 8.9)	8.7 (8.7, 8.7)	16.8 (16.6, 17.0)	16.6 (16.5, 16.7
	Triplets or more			
Canada				
1981–1983	58.3 (50.4, 67.6)	18.0 (17.3, 18.8)	2.2 (1.7, 2.6)	0.6 (0.6, 0.7
1995–1997	48.3 (42.5, 54.8)	20.3 (19.8, 20.8)	3.3 (2.8, 3.8)	1.4 (1.2, 1.5
England–Wales				
1983	39.9 (32.9, 48.4)	16.3 (15.8, 16.8)	1.7 (1.3, 2.1)	0.7 (0.6, 0.7
1995–1997	37.1 (35.1, 39.2)	16.0 (15.9, 16.2)	4.5 (4.2, 4.8)	1.9 (1.8, 2.0
USA				
1981–1983	32.5 (31.3, 33.8)	14.8 (14.6, 14.9)	1.3 (1.2, 1.3)	0.6 (0.5, 0.6
1995–1997	31.5 (30.9, 32.1)	15.1 (15.1, 15.2)	4.4 (4.3, 4.5)	2.1 (2.1, 2.1

Note. CI = confidence interval.
[a]Data from national representative samples of births: 1 in 1981 and 1 each in 1995 and 1998.
[b]Too few cases in the sample.

TABLE 5—Actual and Expected Rates of Preterm Delivery and Low Birthweight in 1995 to 1997

	Actual Rates	Expected Rates		Differences	
	A	B[a]	C[b]	A – B[c]	A – C[d]
Gestational age <37 wk					
Canada	7.0	6.8	6.7	+0 .2	+0 .3
France	5.8	5.4	5.5	+0 .4	+0 .3
USA	11.1	10.7	10.7	+0 .4	+0 .4
Birthweight <2500 g					
Canada	5.7	5.5	5.6	+0 .2	+0 .1
England–Wales	7.3	6.9	7.3	+0 .4	+0 .0
France	6.2	5.8	6.0	+0 .4	+0 .2
USA	7.5	7.2	7.5	+0 .3	+0 .0

[a]Hypothesis: multiple-birth rates are at their 1982 level.
[b]Hypothesis: rates of preterm delivery and low birthweight of multiple births are at their 1981–1983 level.
[c]Expresses the effect of the increase in multiple births.
[d]Expresses the effect of the increases in the rates of preterm delivery and low birthweight among multiple births.

tons.[40] Population-based data show that among twins, the minimum rates of infant death or cerebral palsy occur at earlier gestational ages than among singletons. This finding of lower risks applies only *after* 36 weeks of gestation,[37,43] suggesting that the optimum gestational age for twins is *not* before term. More evidence is therefore needed about the benefits of multiple births before term.

Another approach for lowering the impact of multiple births on overall pregnancy outcome might be through changes in the management of subfertility. It has been taken for granted that multiple births are the price that must be paid for improving fertility rates among all women treated. As experience with subfertility treatment is increasing, more clinicians are becoming aware of the risks of twin births and are advocating better controls of the ART process to decrease the twinning rate.[44,45] For example, in selected groups of women, transferring only 1 embryo results in a satisfactory pregnancy rate.[46] Despite this, it is unlikely that a substantial decrease in the twin rate after subfertility treatment will be observed in the near future. First, knowledge about potential ways of reducing the numbers of twin pregnancies is still limited in ART and in ovarian stimulation. Second, the improvements used to prevent twin births with subfertility treatment may be offset by the larger increases in the numbers of treated couples, as has been observed in ART for triplets. Thus, in France and in England and Wales, the proportion of transfers with 3 or more embryos decreased during the 1990s,[35,47] but this improvement did not lead to a decrease in triplet rates in the overall population.

We based our study on gestational age and birthweight, because these data are monitored in most countries. Other adverse outcomes are also more common among multiple births either because of the high rates of preterm birth and low birthweight or because of the greater complications associated with multiple births. These include fetal and infant mortality,[12] mortality in childhood,[48] congenital anomalies,[49] and cerebral palsy.[37] These indicators should be analyzed along with preterm delivery and low birthweight for singletons and triplets separately when health care services are assessed, either internationally or over time.

CONCLUSIONS

For many reasons, it seems unlikely that the contribution of twin births to preterm delivery and low birthweight will decrease substantially and fall to the level observed in the early 1980s. Research is needed in 2 areas: the reduction of twin rates through fertility treatments on the one hand, and the benefits of delivering twin births before term for specific indications on the other hand. When monitoring health indicators for the overall population, it is important to compile data for singletons, twins, and triplets separately, to take into account the effects of the increase in multiple-birth rates and the variations of these rates between countries. ■

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Contributors

B. Blondel, M.D. Kogan, and G.R. Alexander designed the study. B. Blondel, N. Dattani, M.D. Kogan, and S.W. Wen provided the data from their respective countries. B. Blondel and M.D. Kogan analyzed the data and interpreted the results. B. Blondel and M.D. Kogan wrote the article. M.S. Kramer and A. Macfarlane contributed to the design of the study and the writing of the article.

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